Screening strategies for colorectal cancer: a systematic review of the evidence

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Authors' objectives
The authors assessed the effectiveness of different screening techniques for colorectal cancer (CRC) in asymptomatic people at normal or an above average risk.

Searching
MEDLINE was searched for English language studies published between January 1966 and January 2001; the search terms were listed in the review. The authors also checked the bibliographies of review articles and contacted experts for additional studies.

Study selection
Study designs of evaluations included in the review
The authors did not state what types of studies were eligible for the review. The studies included in the review were systematic reviews, randomised controlled trials (RCTs), uncontrolled trials, diagnostic cohort studies, case-control studies and retrospective analyses of medical charts.

Specific interventions included in the review
For people at normal risk of CRC, studies were eligible for inclusion in the review if they assessed: multiphase screening with the Hemoccult test as the first phase; multiphase screening with sigmoidoscopy; or uniphase screening with colonoscopy. For people at a higher risk of CRC, studies were eligible for inclusion if they assessed: flexible sigmoidoscopy for people with familial adenomatous polyposis; colonoscopy for people at risk of hereditary nonpolyposis colon cancer; or colonoscopy for people with immediate family history of polyps or CRC.

Reference standard test against which the new test was compared
The authors did not define a 'gold' standard comparator as an inclusion criterion. Some studies included in the review used colonoscopy as the gold standard comparator. Others used clinical follow-up to assess mortality and faecal occult blood testing (FOBT) to assess sensitivity and specificity.

Participants included in the review
Studies were eligible for inclusion if they involved people at normal or above average risk of CRC, including people with familial or personal history of the disease. The participants' ages varied between the studies (range: 35 to 80 years). Most of the participants were out-patients.

Outcomes assessed in the review
Studies were eligible for inclusion if they included data on the rates of cancer detection, cancer mortality, adherence, feasibility, or test accuracy. Sensitivity, specificity, positive predictive value, risk ratios and incidence ratios were presented for the individual studies.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The studies were reviewed using the methodology of the Canadian Task Force on Preventive Health Care (see Other Publications of Related Interest). Levels of evidence were ranked using a hierarchy of study designs. The authors did not state how many reviewers performed the validity assessment. After the initial validity assessments were complete, the lead author presented evidence to the Canadian Task Force on Preventive Health Care. Suggestions from the Task Force and four experts in the field were incorporated into the review, but it is unclear whether these suggestions included validity assessments.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
A narrative synthesis was presented, in which the design and outcomes of the individual studies were described. The authors prioritised studies with data on sensitivity, specificity and death due to CRC.

How were differences between studies investigated?
Potential sources of heterogeneity, such as participant characteristics, setting and methodological quality, were described. The authors did not report a formal method for assessing heterogeneity.

Results of the review
The authors did not state clearly the number of each type of study or the total number of participants in the review.

Four RCTs assessed the Hemoccult test (Hemoccult test versus control groups, n=252,045), as did one systematic review that included an additional diagnostic cohort study.

Sigmoidoscopy was assessed in three randomised trials (FOBT versus sigmoidoscopy alone or combined with FOBT, n=15,610), two diagnostic cohorts and three case control studies, including one retrospective analysis of patient charts from a randomised trial.

Uniphase screening with colonoscopy was assessed in four uncontrolled trials and by reanalysis of data from one case-control study and one randomised trial.

Data from retrospective diagnostic case-control studies and cohort studies were used to assess screening strategies for people with a family history of polyps or colon cancer, and those at risk of familial adenomatous polyps and hereditary nonpolyposis colon cancer.

The most rigorous evidence was available for Hemoccult testing. Four randomised trials found the sensitivity of an annual screen ranged from 48 to 79%, with the relative risk of death from CRC ranging from 0.67 to 0.88. Other findings were presented in the review.

Authors' conclusions
There was some evidence to support annual or biennial FOBT and flexible sigmoidoscopy in asymptomatic people aged over 50 years who were at normal risk of CRC. The relative benefits of FOBT and sigmoidoscopy are uncertain in this population. Evidence for the use of colonoscopy as an initial screen was also unclear.

For people with an above average risk of CRC there was some evidence for genetic testing, flexible sigmoidoscopy for people at risk of familial adenomatous polyposis, and colonoscopy for people at risk of hereditary nonpolyposis colon cancer.

CRD commentary
The research question in this review was very broad. The review included both people at normal risk and those at higher risk of CRC. It also included numerous screening strategies and multiphase as well as single-phase techniques. This broad scope means that the findings are complex. Only one database was searched and non-English language studies were excluded. Thus, it is possible that not all relevant studies were included.

It was difficult to assess the quality of the findings because the procedures used to select the studies, assess validity and extract the data were not described in full. Although a checklist for assessing validity was used, it was unclear how
different levels of evidence were weighted when drawing the conclusions. The authors did not discuss possible sources of bias. It was unclear how many participants were involved in some cohort or case-control studies.

The synthesis of the findings was somewhat difficult to follow. The narrative summary was not organised according to study quality, e.g. the evidence from randomised trials was sometimes presented following the results of case-control or cohort studies. Different data were provided for different studies. In some cases odds ratios or compliance estimates were presented; in other instances, specificity and relative risks were described, making comparisons difficult. The authors did not attempt to pool estimates of relative risk or to weight the data in any way. The authors reported ranges in sensitivity, but specificity estimates were not reported alongside. Since sensitivity and specificity are highly related, it may be important to report them together for each study where possible.

Overall, although this review provided much detail about studies of different screening methods, it was difficult to assess whether the final conclusions are valid due to inconsistent data presentation and incomplete methodological details.

**Implications of the review for practice and research**

**Practice:** The authors suggested that annual or biennial FOBT and flexible sigmoidoscopy may be beneficial in asymptomatic people aged over 50 years who are at normal risk of CRC. The relative benefits of FOBT, sigmoidoscopy and initial screening with colonoscopy are uncertain in this population. For people with an above average risk of CRC, there is some evidence supporting genetic testing, flexible sigmoidoscopy for people at risk of familial adenomatous polyposis, and colonoscopy for people at risk of hereditary nonpolyposis colon cancer.

**Research:** The authors suggested that there is a need for better risk stratification in screening. There is also a need for randomised trials on the effectiveness and feasibility of screening methods not covered by this review.

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**Bibliographic details**


**PubMedID**

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**Other publications of related interest**


This additional published commentary may also be of interest. Fletcher R. Review: Hemoccult screening reduces death from colorectal cancer in average-risk patients > 50 years of age. ACP J Club 2002;136:91.

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.